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# AIR FORCE

## HUMAN RESOURCES

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RACIAL EQUITY IN SELECTION IN AIR
FORCE OFFICER TRAINING SCHOOL AND
UNDERGRADUATE FLYING TRAINING

By

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Air Force Officer Qualifying Test composite scores were obtained for 274 Airman Education and Commissioning Program (AECP) officer training school (OTS) students and 15,532 undergraduate flying training (UFT) students. College grade point average (GPA) were also obtained for the AECP group. The objective was to determine the extent of any racial bias present in certain officer selection and classification procedures. For non-whites in the AECP group, OTS graduation rates and final grades were lower than would be expected from test scores or GPAs. UFT graduation rates for Blacks were also over-predicted by AFOQT composites.

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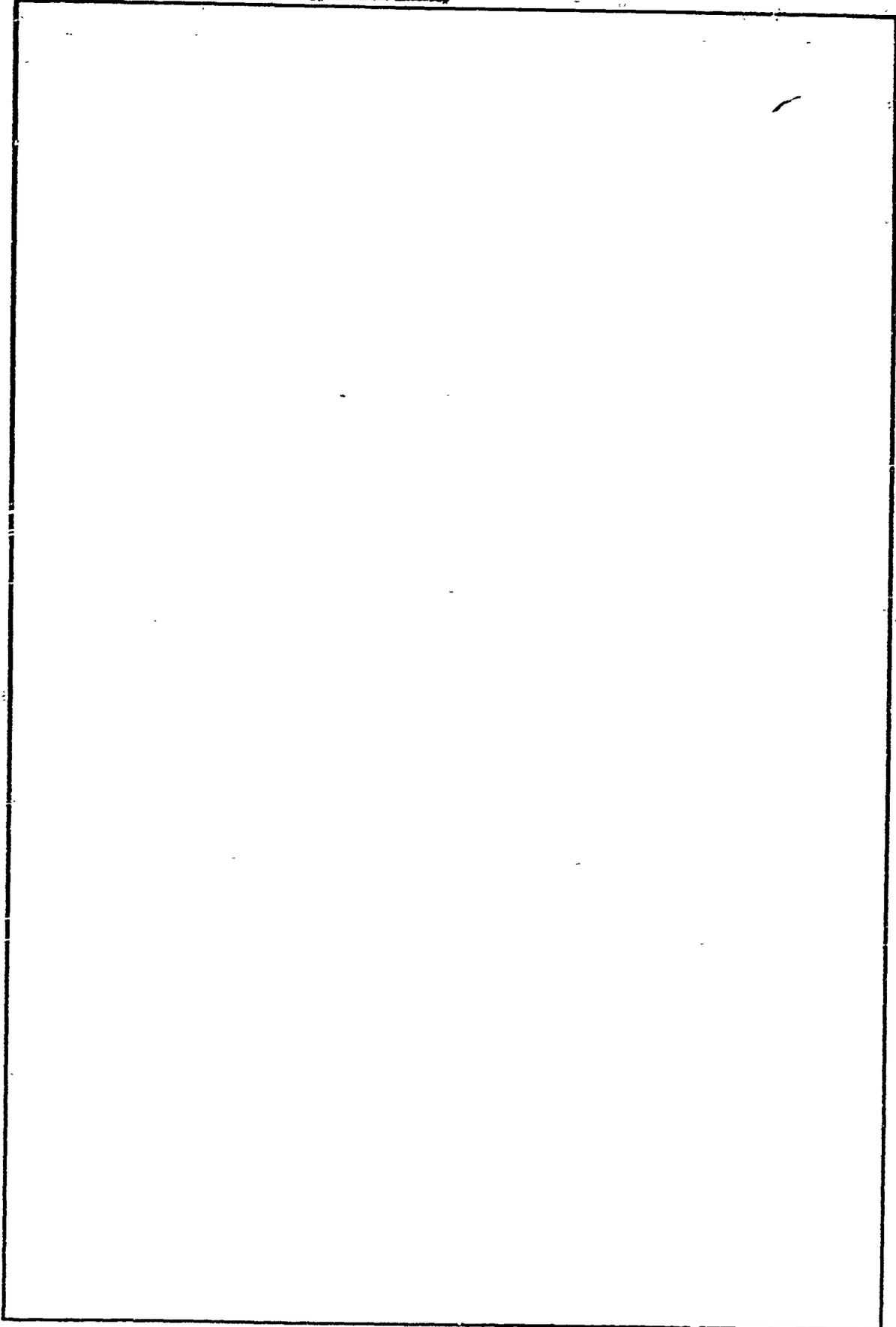
# PREFACE

This research was conducted under project 7719, Air Force Development of Selection, Assignment, Performance Evaluation, Retention and Utilization Devices; task 771912, Air Force Selection and Classification Programs. work unit 77191214 was established in response to Requirement for Personnel Research (RPR 72-10), submitted by AFMPC/DPMY (Maj. Wayne Sellman, Requirements Manager), entitled "AFOQT Evaluation (ACP 80/80 Program)." This report also covers analyses done under work unit 77191207.

The professional and technical assistance provided during the course of this research by the Computational Sciences Division and the Testing Branch of the Personnel Research Division is greatly appreciated.

Data were collected and preliminary analyses were accomplished by the late Robert E. Miller. Mr. John Mathews completed the analyses and prepared this technical report.

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# RACIAL EQUITY IN SELECTION IN AIR FORCE OFFICER TRAINING SCHOOL AND UNDERGRADUATE FLYING TRAINING

## I. INTRODUCTION

With the emergence, in the late 1960's, of increased concern over possible bias against minorities in officer selection, various studies of equity in officer selection were initiated. This report involves two such studies, one dealing with Officer Training School (OTS) students and one dealing with Undergraduate Flying Training (UFT) students. Analyses reported here are of particular interest because they provide the only instance over the past 15 years in which officer selection data could be collected with some relaxation of usual selection standards.

The Air Force Officer Qualifying Test (AFOQT) is one of several factors considered in officer selection decisions. It is used mainly for selection for commissioning programs, selection for pilot and navigator training, and assistance in assigning non-rated officers. The present AFOQT represents a consolidation, and periodic update, of selected portions of the older Aircrew Classification Batteries (ACB) and the Aviation Cadet-Officer Candidate Qualifying Test. The ACB, developed early in World War II, provided an economical way to screen a large and heterogeneous applicant pool to identify individuals most likely to complete training. Unlike the present AFOQT, the battery contained perceptual-motor tests, which contributed to prediction, as well as paper-and-pencil measures.

The validity of portions of the ACB was assessed for a World War II "1,000 Case Study" group which was not screened on any tests (DuBois, 1947). The point biserial correlation of the ACB pilot stanine (standard scores with a range of 1–9) with elementary pilot training graduation/elimination was .50, and the graduation rate was 41%.[1] The Aviation Cadet-Officer Candidate Qualifying Test was designed to predict performance in officer entry training and provides a means for application of uniform

minimum academic standards to a relatively heterogeneous applicant pool. It was composed entirely of paper-and-pencil tests. The composite validities for officer candidate school (OCS) graduation/elimination and final academic grade were .29 and .50, respectively (Tupes, 1953).

ACB data are available on a group of 356 (referred to as the "Tuskegee" sample) Black applicants for pilot training who had a mean pilot stanine of 3.60. Of these, 298 with a mean stanine of 5.17 entered elementary pilot training, and 64% graduated. The uncorrected validity of the pilot stanine for the Blacks was .18. However, a multiple correlation of .42 was reported for this sample with the ACB. This value was based on corrected validities for 10 tests, three of which were psychomotor measures. Because of difficulty in filling quotas, lower cutoff scores were used for Blacks, resulting in a larger proportion of Blacks than whites qualifying. The overall graduation rate in classes containing the Tuskegee sample was 78%, and the mean pilot stanine was 6.87. The overall uncorrected validity of the stanine for these 1943 classes was .29. From this data, it is apparent that the mean scores, graduation rates, and test validity were all lower for Blacks than for their classmates.

AFOQT reported validities in recent years have been a little lower than those observed earlier. These reductions probably can be attributed to reductions in variability among trainees due to selection, greater homogeneity in background, and the absence of perceptual-motor tests. Content of the AFOQT and its predecessors was based on analyses and consideration of the criteria to be predicted. Air Force population data bases available at the time of analyses were utilized. Special, separate consideration of minority performance was not included in the development studies. It was impossible to identify minority group members. This, coupled with the recurring observation of lower test performance of minorities, has led to allegations of test inequity or bias.

The major objective of the present study was to determine the extent to which racial bias is present in various officer selection and classification procedures. The study involves validation of

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[1] Validities originally reported as biserial correlations have been converted to point biserials for comparison with present data.

AFOQT scores for whites and non-whites against performance in OTS, graduation from undergraduate pilot training (UPT) and undergraduate navigator training (UNT), and officer effectiveness reports (OER). In addition, college grade point averages (GPA) were compared to performance of the Airman Education and Commissioning Program (AECP) sample to see if such information might provide a feasible alternative or supplement to the AFOQT for AECP selection. The AECP sample will be followed up in a future report dealing with subsequent OERs and promotions.

## II. METHOD

### Subjects

Participants in three types of training were included in various phases of the study. A sample of OTS entrants from the AECP provided an opportunity to examine the validity of several predictors of non-rated officer performance under exceptional conditions. This group was admitted to OTS under a special Airman Commissioning Program (ACP) 80/80 project in which first-term airmen with college degrees were selected without reference to AFOQT scores. The sample includes 136 white and 138 non-white members of OTS classes 73-05 through 74-15; the program originally called for admission of 80 white and 80 minority applicants.

Criterion data were available for all racially identifiable UPT (N = 18,631) and UNT (N = 6,428) entrants in fiscal years 1969 through 1974. Predictor test scores for both white and Black subgroups were available only for FY69 through FY72 classes (white N = 15,296; Black N = 236).

### Predictor Variables

AFOQT composite percentiles and subtest scores, race, and college GPAs were used as predictors. The composition of the AFOQT is shown in Table 1. The interpretation of the test scores has been covered by Miller (1969).

*Table 1.* Content and Organization of a Recent Form of the AFOQT

| Booklet and Subtest | No. of Items | Pilot | Nav-Tech. | Off. Qual. | Verbal | Quant. |
|---|---|---|---|---|---|---|
| **Booklet 1** | | | | | | |
| Quantitative Aptitude | 60 | | X | X | | X |
| **Booklet 2** | | | | | | |
| Verbal Aptitude | 60 | | | X | X | |
| Officer Biographical Inventory | 100 | | | X | | |
| **Booklet 3** | | | | | | |
| Scale Reading[a] | 48 | | X | | | |
| Aerial Landmarks[a] | 40 | | X | | | |
| General Science | 24 | | X | | | |
| **Booklet 4** | | | | | | |
| Mechanical Information | 24 | X | X | | | |
| Mechanical Principles | 24 | X | X | | | |
| **Booklet 5** | | | | | | |
| Pilot Biographical Inventory | 50 | X | | | | |
| Aviation Information | 24 | X | | | | |
| Visualization of Maneuvers[a] | 24 | X | | | | |
| Instrument Comprehension[a] | 24 | X | | | | |
| Stick and Rudder Orientation[a] | 24 | X | | | | |

[a]Speeded subtests.

## Performance Criteria

For the AECP samples, OTS criteria available were graduation/elimination (G/E) status for entrants and final grade average for OTS graduates. Post-OTS data collected for this group included G/E status for technical school entrants and initial OERs.

UPT and UNT criteria were G/E for the respective flight courses. The basic assumption of any test bias study is that the criterion which the test is designed to predict is unbiased.

## Statistical Method

Predictor, criteria, and racial identification data were obtained from Air Force Officer Qualifying Test records and OTS graduation, flying training, OER, and uniform officer record files maintained by the Computational Sciences Division, Air Force Human Resources Laboratory. The principal analyses involved multiple linear regression techniques as outlined by Bottenberg and Ward (1963). Bias in selection testing cannot be assumed on the basis of mean differences in test and criterion performance alone. If the means on both test and criterion do not differ significantly for two groups, or if one group scores higher on both the test and criterion, the test is not considered unfair or biased. In this study, bias in testing is considered to exist when the relationships between test scores and criterion scores differ from one group to another.

When regression lines are parallel but the intercepts are different, level bias is said to exist. This means the difference in test scores between subgroups for the same predicted criterion score differs by a constant amount over the entire range of criterion scores. On the other hand, when regression lines are not parallel, another type of bias defined as slope bias may exist. In this case, the differences in predicted criterion performance between the subgroups for various test score levels are not constant. For a more detailed discussion of types of bias, see Guinn, Tupes, and Alley (1970b).

## III. RESULTS AND DISCUSSION

### Officer Training School Data

AFOQT means and standard deviations for various samples are presented in the appendix. Because they were not screened on the AFOQT, the AECP sample of 274 from the OTS ACP 80/80 program should give the best indication available of non-rated officer candidates' performance on this test (Table A1). As Figure 1 indicates, non-white OTS entrants averaged about one standard deviation (SD) less than whites on the Verbal, Quantitative, and Officer Quality composites of the AFOQT. On the Officer Biographical Inventory subtest, non-whites did relatively better but still scored about one-half SD lower than whites.

OTS criteria available for the AECP sample were G/E status for entrants and final grade average for OTS graduates (Table A2). Since only 6.6% of the group were attrited, the variance of the G/E variable is low. This is especially true for the white sample in which just 1.5% were attrited. The use of such extreme splits for statistical purposes is undesirable. Therefore, the final grade criterion will be a more useful indication of predictor validity in OTS.

Post-OTS criteria pertained to technical school graduation and initial OERs. Because only one technical school entrant was eliminated, this measure was deleted from the analyses. The OER data also exhibited little variance but were retained in order to assess possible post-training validities.

G/E correlated significantly with all AFOQT measures analyzed for the total AECP group, the $r$'s ranging from .15 to .17 (Table A3). However, none of the $r$'s were significant for either the white or non-white subgroup. OTS final grade correlated from .17 to .51 with the measures. The coefficients were quite similar for whites and non-whites on all tests and were significant for each subgroup on the Verbal, Quantitative, and Officer Quality composites. The initial OER was significantly related ($r = .17$) to only the Quantitative scores for the two racial groups combined.

Lower performance on tests and in OTS by minorities can be attributed to factors other than race per se. Previous research with enlisted personnel (Guinn, Tupes, &. Alley, 1970b) has demonstrated that cultural variables such as geographical area and education which often co-vary with race are also related to criterion and test performance. Those members of the AECP sample who were from the South and Southwest had lower graduation rates than those from other areas (Table A4). Also, the correlation between race and area (other vs. South-Southwest) was .38, indicating that non-whites are substantially over-represented in the southern area. If the relationship between area and race is partialled
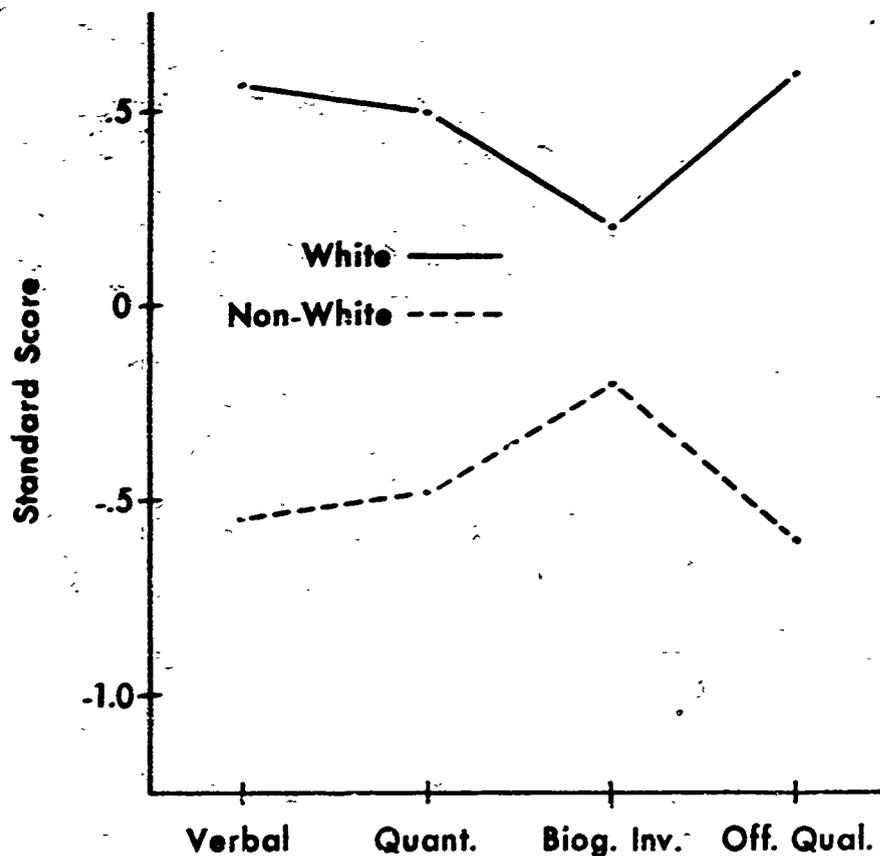
*Figure 1.* AFOQT performance of AECP OTS participants by race.

out, the correlation between race and G/E drops from .20 to .14. This means that area appears to be about as influential as race in determining success in OTS.

The first regression analysis performed for each training group was to ascertain whether the regression lines predicting white and non-white performance were identical. For all three criteria on the AECP OTS sample, some type of bias was indicated for all AFOQT predictors listed in Table A5. Another series of analyses was performed to determine whether slope (non-parallel prediction) or intercept bias was present. No significant differences in the slopes of any pairs of regression lines were found. Statistically significant differences were detected between the levels (or intercepts) of all pairs of lines. In each case, non-white performance was over-predicted. This means their level of performance was less than would be expected from their test scores. For example, the predicted OTS graduation rate for non-whites would be 91.1%; whereas their actual graduation rate was 88.4%.

The feasibility of utilizing college GPAs as an alternative (or supplement) to the AFOQT in AECP selection for OTS was examined. The college GPA mean of white OTS entrants was .4 point (on a 4-point scale with A = 4) higher than that of non-white entrants. For both racial groups combined, college GPA correlated significantly with OTS G/E and final grade (Table A6). A comparison of GPA and the Officer Quality composite of the AFOQT in relation to OTS class standing is shown in Figure 2. For combined racial groups, those in the top quarter of their class had the highest means on both predictors. The second through fourth quarter means were progressively lower on both measures, and the eliminees had the lowest means. The multiple correlation predicting OTS Final Grade from GPA and Officer Quality is .54, which is significantly greater than the correlation of .50, utilizing only the Officer Quality composite.

Multiple linear regression analyses were accomplished to determine if racial bias is present when GPA is used to predict AECP performance
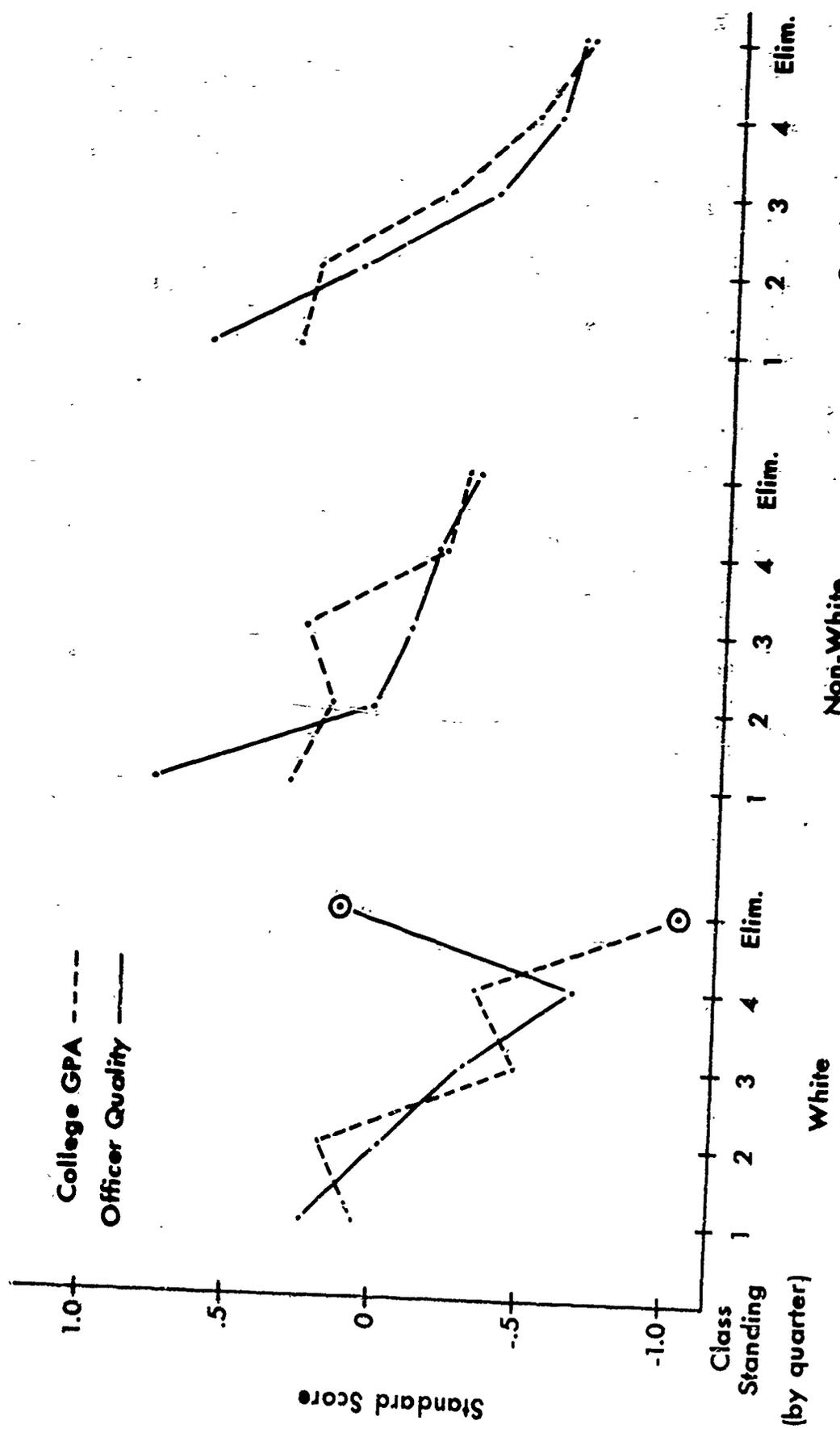
*Figure 2.* Comparison of college GPA and Officer Quality as predictors in OTS.

criteria (Table A7). For all these criteria, significant level bias, but no slope bias, was indicated. As with the AFOQT predictors, non-white performance was over-predicted.

**Undergraduate Flying Training Data**

Since the UFT students have been screened on the AFOQT and since they are graduates of OTS or Reserve Officers' Training Corps (ROTC), their test performance would be expected to be better than that of the AECP sample. This restriction in range decreases score variation between individuals and groups and also deflates any correlations involving the scores. Despite these considerations, white UPT participants had higher mean scores than Blacks on all AFOQT measures included in Table A8. The largest differences involved the Quantitative and Officer Quality composites, and the smallest differences were on the Officer and Pilot Biographical Inventories (Figure 3). White UNT students also had higher averages than Blacks on the same AFOQT measures (Table A9). The largest differences were on the Quantitative and Navigator composites while the smallest differences involved the Biographical Inventories and the Verbal composite (Figure 4).

AFOQT validity data were obtained for UFT students from FY69 through FY72 classes. Correlations of the predictors with G/E were low although many were significant due to the size of some samples (Tables A10 and A11). This marginal validity was expected due to the pre-screening mentioned earlier. For the white UPT samples, the Pilot composite had the highest validities: .15 each for OTS and ROTC graduates. For the Black samples, however, the validity of the Pilot composite was nonsignificant. The relationship between the Pilot composite and UPT graduation is depicted in Figure 5. The Pilot Biographical Inventory (scores obtained for the OTS samples only) had similar validity for white and Black UPT students, .14 and .18, respectively.

The lack of training relationship found with the Pilot composite for Black students may be partly due to the proportion of racial groups qualifying for UPT. In the OTS AECP sample, only 18% of Blacks had Pilot composite scores high enough to qualify for UPT, while 68% of whites would qualify on the basis of scores. If an equal percentage of Blacks and whites were admitted to UPT, the Pilot composite might demonstrate higher validity because the distribution of scores would be quite different.

The most valid AFOQT measures for UNT participants were the Quantitative and Navigator-Technical composites. Both of these measures correlated somewhat higher for Black than white UNT students. The relationship between the Navigator-Technical composite and UNT graduation is shown in Figure 6.

Tests of equal regression lines based on the Pilot composite scores and race as predictors of UPT G/E were accomplished for OTS and ROTC officers. Indications of bias for both groups were followed up to determine the nature of the differences (Table A12). Significant level differences were found and, in each case, UPT performance of the Black sample was over-predicted. For the ROTC officers, a significant slope difference was indicated. The Pilot composite was invalid for the Black ROTC UPT sample as noted earlier. Pilot Biographical Inventory scores, obtained for the OTS group only, were also used as a predictor in UPT. Black performance was over-predicted based on the Pilot Biographical Inventory, but no slope difference was detected.

The Navigator-Technical composite was the best predictor in regression analyses of UNT graduation for OTS and ROTC officers. Follow-ups of preliminary bias indications revealed significant level differences. Again, performance of Blacks was over-predicted in OTS and ROTC samples. No slope bias was found.

In FY69 through FY74, Blacks represented 1.4% of UPT entrants and 2.3% of UNT entrants. The percentage of Blacks in UNT was higher than UPT for officers from each major source of commission as shown in Table A13. The percentage of Blacks in UNT increased to 2.6% in FY 73-74 from 2.0% in FY 69-72 while the percentage of Blacks in UPT remained the same. The increase in UNT was experienced for Black officers from OTS and ROTC. In UPT, an increase from FY 69-72 to FY 73-74 in Blacks from OTS was offset by a decrease in Blacks from ROTC.

Graduation rates in UFT are presented in Table A14. For FY 69-74 in UPT, 50.8% of Black officers and 71.2% of white officers graduated from training. In UNT, graduation rates were substantially higher (63.4% for Blacks and 85.8% for whites, but the racial difference in rates was about the same). The lower UFT completion rate for Black officers was found for those from all sources of commission and from both time periods examined. However, the differences in rates were
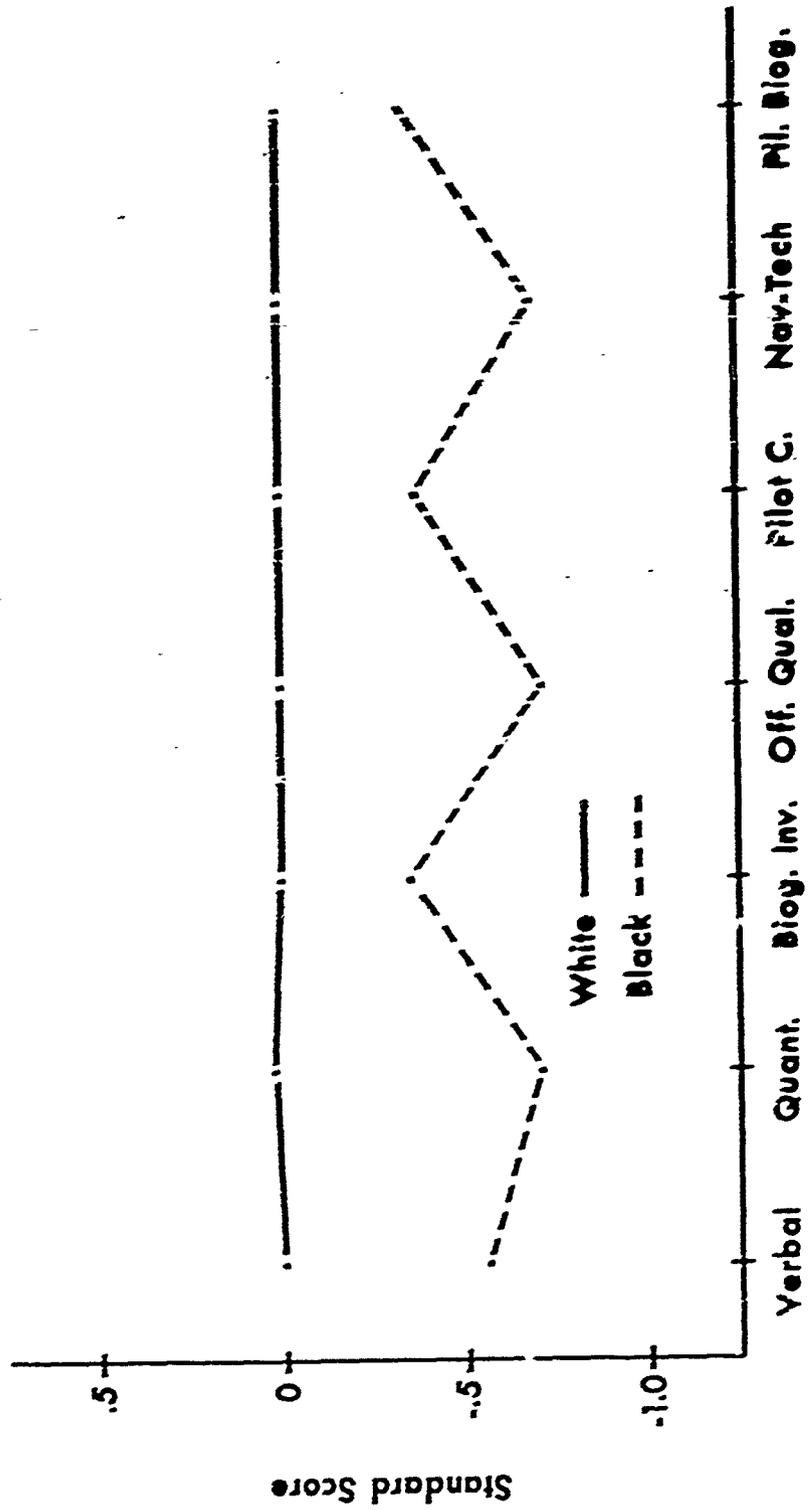
Figure 3. AFOQT performance of UPT participants by race.
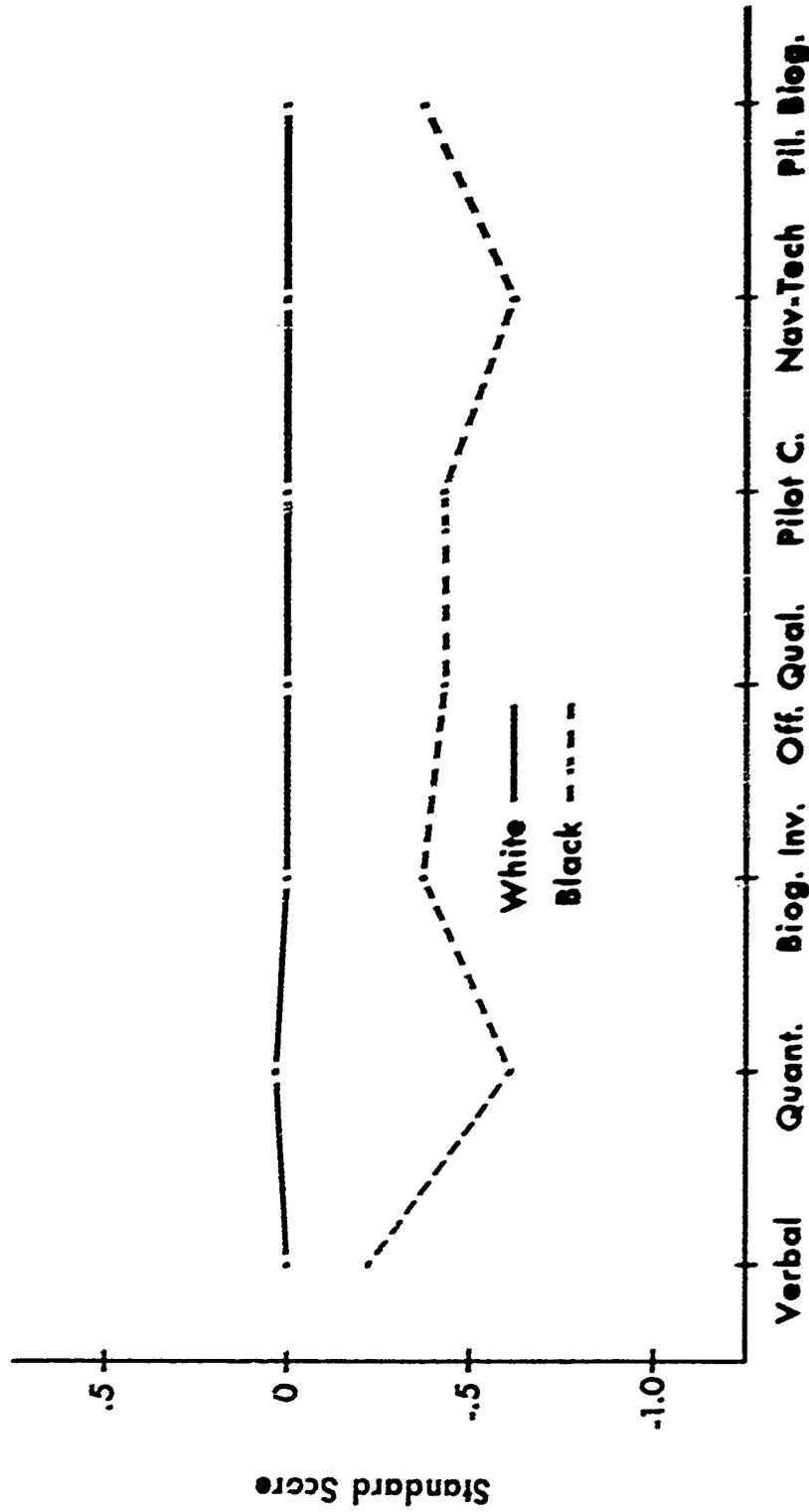
*Figure 4.* AFOQT performance of UNT participants by race.
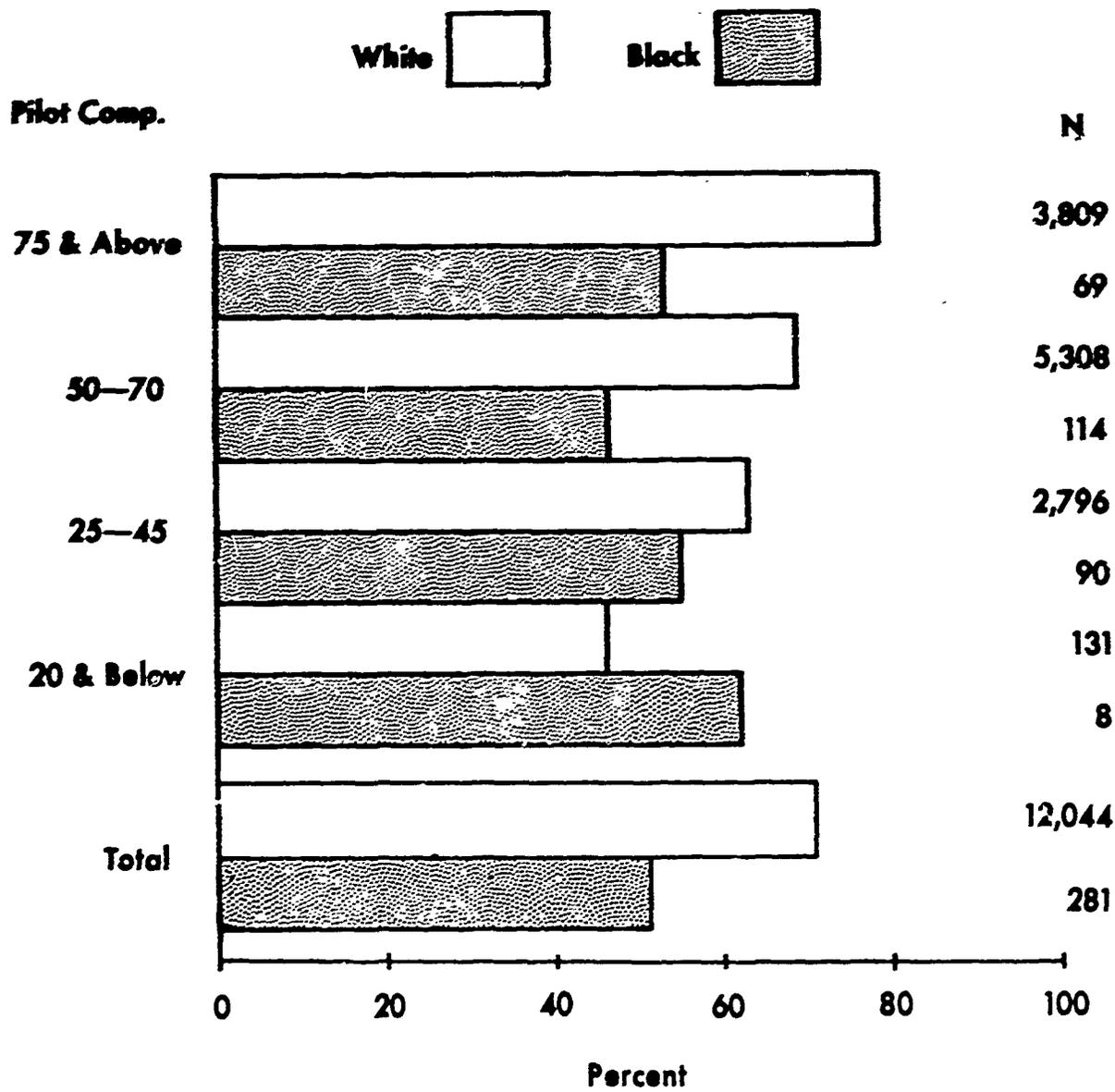
*Figure 5.* UPT graduation rates by levels of Pilot Composite scores.
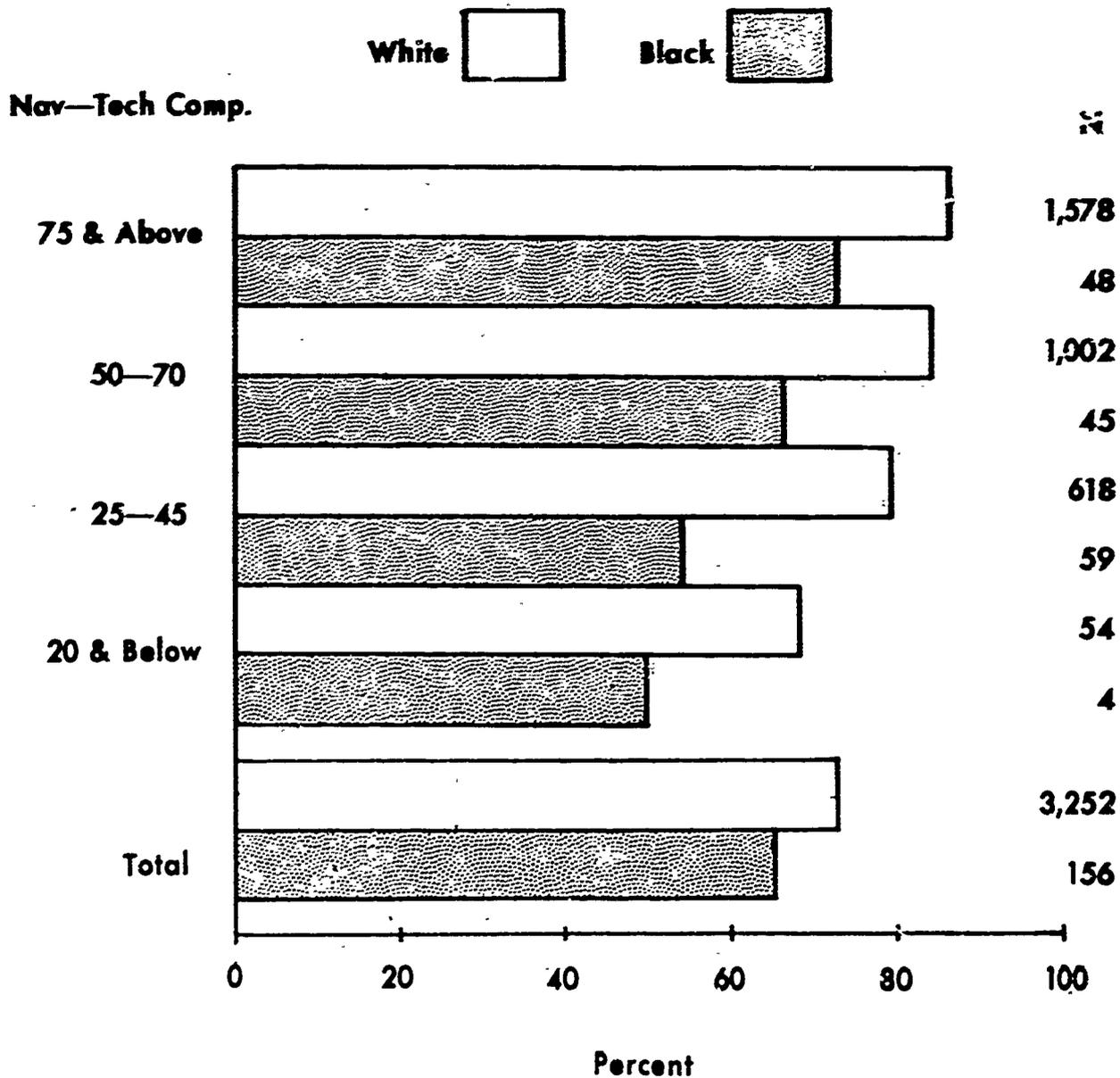
*Figure 6.* UNT graduation rates by levels of Navigator-Technical Composite scores.

less in FY 73-74 for UPT and UNT. The percentages of graduates were higher for both Blacks and whites in the latter time period, but the Black increase was greater.

Only in the lower enlisted Air Force grades is the proportion of Blacks approximately that found in the total population. As shown above, the disproportion has been great in such prestigious programs as UFT. These disproportions have been explained in terms of recruitment by industry, lack of quality education, unawareness of officer programs, inability to identify with white culture, and discrimination (Guimond, 1971). Based on the racial composition of the college manpower pool, it would be expected that about 3% of new officers would be Black. This percentage becomes diminished due to the greater proportion of Blacks failing to achieve minimally qualifying scores on the AFOQT, and it is even further reduced because of the higher attrition rates of Blacks in OTS.

Test bias or discrimination *against* Blacks is *not* supported by the data presented here since Black performance in OTS (and UFT) was over-predicted. Using the overall relationship between AFOQT measures and performance to estimate Black officer training performance, Blacks would be expected to do better in training than they actually did.

## IV. CONCLUSIONS

The main findings of this study are:

1. OTS performance of non-whites was over-predicted by AFOQT composites. Despite having lower scores, their graduation rate and final grades were lower than would be expected from their test scores.

2. The AFOQT Officer Quality composite had higher validity in OTS than GPAs. Although combining GPA and Officer Quality would significantly increase prediction of OTS performance, the unique contribution of GPA in prediction in OTS is relatively small.

3. UFT performance of Blacks was over-predicted by AFOQT composites. While the Navigator-Technical composite was valid for both races in UNT, the Pilot composite demonstrated validity only for whites in UPT. The non-aptitude portion of the Pilot composite (Pilot Biographical Inventory) did appear to be valid for both races, however. The level of test validity for Blacks in UFT may be underestimated due to the small proportion with qualifying scores.

4. Graduation rates for Blacks are about 20% less than for whites. This difference exists for UPT and UNT officers from each source of commission (OTS, ROTC, and AFA).

5. Black officers are somewhat more likely to participate in UNT than UPT.

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*APPENDIX A.* STATISTICAL TABLES.

#### Table A1. AFOQT Means and Standard Deviations for AECP OTS Participants

| AFOQT Composite | | White N = 136 | Non-White N = 138 | Combined N = 274 |
|---|---|---|---|---|
| Verbal | Mean | 42.7 | 11.2 | 26.9 |
|  | SD | 27.6 | 19.3 | 28.5 |
| Quant. | Mean | 38.6 | 8.8 | 23.6 |
|  | SD | 32.9 | 19.4 | 30.8 |
| Biog. Inv.[2] | Mean | 42.0 | 38.6 | 40.3 |
|  | SD | 7.9 | 9.0 | 8.6 |
| Off. Qual. | Mean | 50.8 | 11.1 | 30.8 |
|  | SD | 32.4 | 20.4 | 33.5 |

[2] White N = 130, Non-white N = 135.

#### Table A2. Criteria Means and Standard Deviations for AECP OTS Participants

| Criterion | | White | Non-White | Combined |
|---|---|---|---|---|
| OTS Graduation/Elimination | N | 136 | 138 | 274 |
|  | Mean | .99 | .88 | .93 |
|  | SD | .10 | .32 | .25 |
| OTS Final Grade | N | 134 | 122 | 256 |
|  | Mean | 91.92 | 88.42 | 90.25 |
|  | SD | 2.87 | 3.33 | 3.55 |
| Officer Effectiveness Report (OER) | N | 100 | 101 | 201 |
|  | Mean | 8.55 | 8.27 | 8.41 |
|  | SD | .56 | .20 | .65 |

#### Table A3. AFOQT Validation Against Various Criteria for AECP OTS Participants

| AFOQT Composite | White | | | Non-White | | | Combined | | |
|---|---|---|---|---|---|---|---|---|---|
|  | Grad/Elim. N = 136 | Final Grade N = 134 | First OER N = 100 | Grad/Elim. N = 138 | Final Grade N = 122 | First OER N = 101 | Grad/Elim. N = 274 | Final Grade N = 256 | First OER N = 201 |
| Verbal | −.03 | .36** | .01 | .15 | .33** | .02 | .17** | .51** | .13 |
| Quant. | .00 | .23* | −.05 | .13 | .18* | .14 | .15* | .38** | .17* |
| Biog. Inv. | .03 | .12 | −.09 | .15 | .11 | .10 | .15* | .17** | .05 |
| Off. Qual. | −.02 | .34** | −.10 | .11 | .27** | .14 | .16** | .50** | .13 |

*Significant at .05 level.

**Significant at .01 level.

*Table A4.* **Regional Distribution by Race and Graduation/Elimination From OTS for AECP Sample**

| | Race | | | | OTS Status | | |
|---|---|---|---|---|---|---|---|
| | White | | Non-White | | Grad. | Elim. | Grad. |
| Home of Record | N | % | N | % | N | N | % |
| Northeast (NE)[a] | 32 | 23.5 | 7 | 5.1 | 35 | 4 | 89.7 |
| North Central (NC) | 37 | 27.2 | 14 | 10.2 | 51 | 0 | 100.0 |
| South (S) | 32 | 23.5 | 85 | 61.6 | 103 | 14 | 88.0 |
| West (W) | 25 | 18.4 | 19 | 13.7 | 44 | 0 | 100.0 |
| Non-Contiguous States or Unknown | 10 | 7.4 | 13 | 9.4 | 23 | 0 | 100.0 |
| Total | 136 | 100.0 | 138 | 100.0 | 256 | 18 | 93.4 |

[a]NE = New England + Midcastern; NC = Great Lakes + Plains; S = Southeast + Southwest; and W = Rocky Mountains + Far West.

*Table A5.* **Regression Analyses Results for AECP OTS Participants**

| Criterion | AFOQT Predictor | Multiple Correlation Squared ($R^2$) | | | Tests for Homogeneity | | |
|---|---|---|---|---|---|---|---|
| | | Model A[a] | Model B[b] | Model C[c] | Any Bias F(A vs. C) | Slope Bias F(A vs B) | Level Bias F(B vs C) |
| OTS Grad./Elim. | Verbal | .054 | .047 | .030 | 3.5* | 2.1 | 4.9* |
| (N = 274) | Quant. | .052 | .045 | .022 | 4.0* | 1.4 | 6.5* |
| | Biog. Inv. | .061 | .055 | .023 | 5.3** | 1.8 | 8.8** |
| | Off. Qual | .052 | .044 | .026 | 3.7* | 2.3 | 5.1* |
| OTS Grade | Verbal | .327 | .324 | .259 | 13.6** | 1.4 | 25.8** |
| (N = 256) | Quant. | .278 | .271 | .147 | 4.0* | 1.4 | 6.5* |
| | Biog. Inv. | .252 | .249 | .028 | 36.5** | 1.2 | 71.8** |
| | Off. Qual. | .314 | .312 | .250 | 11.8** | 0.7 | 22.9** |
| First OER | Verbal | .047 | .047 | .012 | 3.0* | 0.0 | 6.0* |
| (N = 201) | Quant. | .064 | .053 | .030 | 3.6* | 2.3 | 4.8* |
| | Biog. Inv. | .049 | .048 | .030 | 4.8** | 0.3 | 9.3** |
| | Off. Qual. | .067 | .063 | .017 | 5.2** | 0.8 | 9.6** |

[a]Model A includes test predictor, race, and interaction of test x race.

[b]Model B includes test predictor and race.

[c]Model C includes test predictor only.
 *Significant at .05 level.
**Significant at .01 level.

*Table A6.* **Means, Standard Deviations and Validities of College GPA for AECP Sample**

| | | | Validities | | |
|---|---|---|---|---|---|
| Group | Mean | Sd | Grad/ Elim | Final Grade | First OER |
| White | 2.83 | .48 | .14 | .11 | −.06 |
| Non-White | 2.45 | .38 | .10 | .32** | .12 |
| Combined | 2.65 | .47 | .17* | .37** | .13 |

 *Significant at .05 level.
**Significant at .01 level.

*Table A7.* Results of Regression Analyses Involving College GPAs of AECP OTS Participants

| Criterion | N | Multiple Correlation Squared ($R^2$) | | | Tests for Homogeneity | | |
|---|---|---|---|---|---|---|---|
| | | Model A[a] | Model B[b] | Model C[c] | Any Bias F(A vs C) | Slope Bias F(A vs B) | Level Bias F(B vs C) |
| OTS Grad/Elim | 229 | .055 | .050 | .027 | 3.3* | 1.3 | 5.4* |
| OTS Final Grade | 215 | .284 | .277 | .133 | 22.1** | 2.1 | 42.0** |
| First OER | 186 | .065 | .049 | .016 | 4.7** | 3.2 | 6.2* |

[a]Model A includes GPA, race, and interaction of GPA x race.

[b]Model B includes GPA and race.

[c]Model C includes GPA only.
*Significant at .05 level.
**Significant at .01 level.

*Table A8.* AFOQT Means and Standard Deviations for UPT Participants

| AFOQT Composite | | White | | | Black | | |
|---|---|---|---|---|---|---|---|
| | | OTS N = 6,912 | ROTC N = 5,132 | Total N = 12,044 | OTS N = 59 | ROTC N = 111 | Total N = 170 |
| Verbal | M | 57.4 | 58.4 | 57.8 | 52.0 | 40.4 | 44.4 |
| | SD | 24.3 | 23.5 | 24.0 | 27.2 | 26.8 | 23.2 |
| Quant. | M | 58.0 | 54.1 | 56.3 | 45.9 | 33.5 | 37.8 |
| | SD | 26.5 | 25.7 | 26.2 | 24.1 | 21.6 | 23.2 |
| Bio. Inv. | M[a] | 39.6 | — | 39.6 | 36.8 | — | 36.8 |
| | SD | 7.9 | — | 7.9 | 12.1 | — | 12.1 |
| Off. Qual. | M | 70.9 | 64.6 | 68.2 | 64.6 | 45.8 | 52.0 |
| | SD | 22.0 | 22.7 | 22.5 | 22.5 | 23.3 | 24.6 |
| Pilot Comp. | M | 61.9 | 62.5 | 62.1 | 58.6 | 52.1 | 54.4 |
| | SD | 18.4 | 21.7 | 19.9 | 21.0 | 21.0 | 21.3 |
| Nav-Tech C. | M | 71.7 | 59.5 | 66.5 | 62.7 | 43.6 | 50.0 |
| | SD | 22.2 | 23.7 | 23.6 | 24.9 | 24.5 | 26.2 |
| Pilot Biog. | M[a] | 25.5 | — | 25.5 | 23.3 | — | 23.3 |
| | SD | 6.7 | — | 6.7 | 7.0 | — | 7.0 |

[a]Raw Scores. White N = 5,137 and Black N = 32.

Table A9. AFOQT Means and Standard Deviations for UNT Participants

| AFOQT Test | | White | | | Black | | |
|---|---|---|---|---|---|---|---|
| | | OTS N = 2,125 | ROTC N = 1,127 | Total N = 3,252 | OTS N = 35 | ROTC N = 31 | Total N = 66 |
| Verbal | M | 57.0 | 60.8 | 58.3 | 52.9 | 52.7 | 52.8 |
| | SD | 24.6 | 23.8 | 24.4 | 25.6 | 23.3 | 24.4 |
| Quant. | M | 59.8 | 54.1 | 57.8 | 48.6 | 35.5 | 42.4 |
| | SD | 25.3 | 24.5 | 25.2 | 27.8 | 20.6 | 25.6 |
| Biog. Inv. | $M^2$ | 38.1 | — | 38.1 | 35.0 | — | 35.0 |
| | SD | 8.3 | — | 8.3 | 11.9 | — | 11.9 |
| Off. Qual. | M | 70.8 | 66.1 | 69.2 | 63.9 | 55.2 | 59.8 |
| | SD | 21.7 | 22.4 | 22.1 | 22.9 | 23.4 | 23.4 |
| Pilot Comp. | M | 54.9 | 56.8 | 55.6 | 47.9 | 45.0 | 46.5 |
| | SD | 21.0 | 23.1 | 21.7 | 22.8 | 22.6 | 22.6 |
| Nav-Tech C. | M | 72.1 | 59.0 | 67.6 | 62.3 | 43.6 | 53.5 |
| | SD | 20.9 | 22.4 | 22.3 | 22.1 | 23.7 | 24.9 |
| Pilot Biog. | $M^2$ | 23.1 | — | 23.1 | 20.6 | — | 20.6 |
| | SD | 6.9 | — | 6.9 | 7.1 | — | 7.1 |

[a]Raw Scores. White N = 1,620 and Black N = 21.

Table A10. AFOQT Validities Against UPT Graduation/Elimination

| AFOQT Test | White | | | Black | | |
|---|---|---|---|---|---|---|
| | OTS N = 6,912 | ROTC N = 5,132 | Total N = 12,044 | OTS N = 59 | ROTC N = 111 | Total N = 170 |
| Verbal | −.10** | −.08** | −.09** | .02 | .05 | .00 |
| Quant. | .05** | .10** | .06** | .03 | .18* | .07 |
| Biog. Inv.[a] | .01 | — | .01 | .03 | — | .01 |
| Off. Qual. | −.04** | .03* | −.03** | −.13 | .13 | −.03 |
| Pilot Comp. | .15** | .15** | .15** | −.02 | −.05 | −.07 |
| Nav-Tech C. | .07** | .12** | .04** | −.18 | .02 | −.11 |
| Pilot Biog.[a] | .14** | — | .14** | .18 | — | .18 |

[a]White N = 5,137 and Black N = 32.
*Significant at .05 level.
**Significant at .01 level.

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#### Table A11. AFOQT Validities Against UNT Graduation/Elimination

| AFOQT Test | White | | | Black | | |
|---|---|---|---|---|---|---|
| | OTS N = 2,125 | ROTC N = 1,127 | Total N = 3,252 | OTS N = 35 | ROTC N = 31 | Total N = 66 |
| Verbal | −.01 | −.02 | .01 | −.03 | −.27 | −.14 |
| Quant. | .10** | .18** | .12** | .36* | .11 | .26* |
| Biog. Inv.[a] | −.03 | — | −.03 | −.04 | — | −.04 |
| Off. Qual. | .01 | .07* | .03 | .20 | −.04 | .10 |
| Pilot Comp. | .07** | .07* | .07** | −.05 | .22 | .08 |
| Nav-Tech C. | .08** | .18** | .10** | .20 | .07 | .15 |
| Pilot Biog.[a] | .01 | — | .01 | −.03 | — | −.03 |

[a]White N = 1,620 and Black N = 21.
*Significant at .05 level.
**Significant at .01 level.

#### Table A12. Regression Analyses Results for UPT and UNT Participants

| Criterion/ Test | N | Multiple Correlation Squared ($R^2$) | | | Tests for Homogeneity | | |
|---|---|---|---|---|---|---|---|
| | | Model A[a,b] | Model B[b] | Model C[c] | Any Bias F(A vs C) | Slope Bias F(A vs B) | Level Bias F(B vs C) |
| **UPT Graduation** | | | | | | | |
| Pilot Comp. | | | | | | | |
| OTS | 6,971 | .025 | .025 | .023 | 10.1** | 2.1 | 17.9** |
| ROTC | 5,243 | .029 | .028 | .023 | 14.4** | 4.7* | 24.1** |
| Pilot Biog. | | | | | | | |
| OTS | 5,169 | .022 | .022 | .020 | 6.8** | 0.0 | 13.6** |
| **UNT Graduation** | | | | | | | |
| Nav-Tech Comp. | | | | | | | |
| OTS | 2,160 | .086 | .086 | .080 | 6.6** | 0.0 | 13.1** |
| ROTC | 1,158 | .052 | .052 | .035 | 10.2** | 0.2 | 20.1** |

[a]Model A includes test predictor, race, and interaction of test x race.
[b]Model B includes test predictor and race.
[c]Model C includes test predictor only.
*Significant at .05 level.
**Significant at .01 level.

*Table A13.* Percentages of Racial Groups in UPT and UNT by Source of Commission

| Period | Group | Undergraduate Pilot Training | | | | Undergraduate Navigator Training | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OTS | ROTC | AFA | Total | OTS | ROTC | AFA | Total |
| FY 73–74 | Black | 1.2 | 1.6 | 1.0 | 1.4 | 2.4 | 3.1 | 2.9 | 2.6 |
| | White | 98.6 | 97.5 | 98.9 | 98.1 | 97.4 | 95.7 | 97.1 | 96.9 |
| | Other | 0.2 | 0.9 | 0.1 | 0.5 | 0.2 | 1.2 | 0.0 | 0.5 |
| | Total N | 2,714 | 2,957 | 708 | 6,379 | 2,114 | 806 | 176 | 3,096 |
| FY 69–72 | Black | 0.8 | 2.1 | —[a] | 1.4 | 1.6 | 2.7 | —[a] | 2.0 |
| | White | 99.0 | 97.4 | — | 98.3 | 98.2 | 96.4 | — | 97.6 |
| | Other | 0.2 | 0.5 | — | 0.3 | 0.2 | 0.9 | — | 0.4 |
| | Total N | 6,984 | 5,268 | — | 12,252 | 2,164 | 1,168 | — | 3,332 |
| FY 69–74 | Black | 0.9 | 1.9 | 1.0 | 1.4 | 2.0 | 2.8 | 2.9 | 2.3 |
| | White | 98.9 | 97.5 | 98.9 | 98.2 | 97.8 | 96.2 | 97.1 | 97.3 |
| | Other | 0.2 | 0.6 | 0.1 | 0.4 | 0.2 | 1.0 | 0.0 | 0.4 |
| | Total N | 9,698 | 8,225 | 708 | 18,631 | 4,278 | 1,974 | 176 | 6,428 |

[a]Data not obtained

*Table A14.* Black and White Graduation Rates (%) in UPT and UNT

| Period | Group | Undergraduate Pilot Training | | | Undergraduate Navigator Training | | |
|---|---|---|---|---|---|---|---|
| | | OTS | ROTC | Total | OTS | ROTC | Total |
| FY 73–74 | Black | 40.6 | 60.4 | 52.5 | 64.7 | 76.0 | 68.4 |
| | White | 68.5 | 76.1 | 72.5 | 85.6 | 90.7 | 87.0 |
| | Difference | 27.9 | 15.7 | 20.0 | 20.9 | 14.7 | 18.6 |
| FY 69–72 | Black | 37.3 | 56.8 | 50.0 | 60.0 | 54.8 | 57.6 |
| | White | 64.5 | 78.9 | 70.6 | 83.6 | 86.8 | 84.7 |
| | Difference | 27.2 | 22.1 | 20.6 | 23.6 | 32.0 | 27.1 |
| FY 69–74 | Black | 38.5 | 57.9 | 50.8 | 62.8 | 64.3 | 63.4 |
| | White | 65.6 | 77.9 | 71.2 | 84.6 | 87.2 | 85.8 |
| | Difference | 27.1 | 20.0 | 20.4 | 21.8 | 22.9 | 22.4 |